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Da Silva

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[54] **HAIR-DRIER WITH VALVES FOR CONTROLLING THE AIR FLOW**

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**[3] **A45D 20/26**; F24H 3/00; H05B 1/00

[52] **U.S. Cl.** **219/373**; 34/96; 137/601; 219/368; 219/370

[58] **Field of Search** 219/366–371, 219/373; 239/569, 581; 137/601; 251/228; 34/96–101

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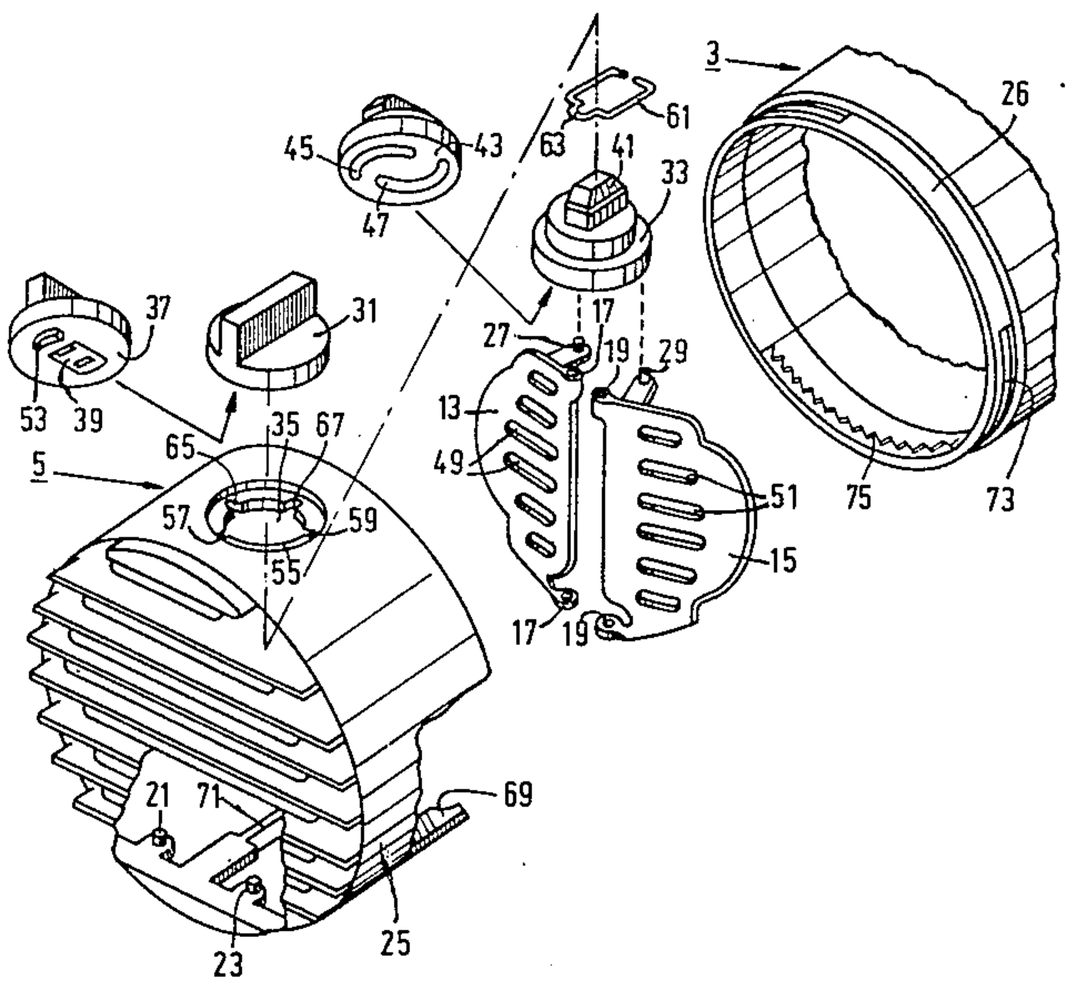
[57] **ABSTRACT**

A hair-drier including a tubular housing having an air outlet is provided with two valve members pivotally mounted in the housing for controlling the flow of air therethrough. An opening is formed in the wall of the housing; and a rotatable member extends through such opening for actuating the valve members, two curved slots being formed in the actuating member. A projection is provided on each valve member for respective engagement with the curved slots so that upon turning of the actuating member, the valve members are pivoted in opposite directions.

6 Claims, 2 Drawing Figures



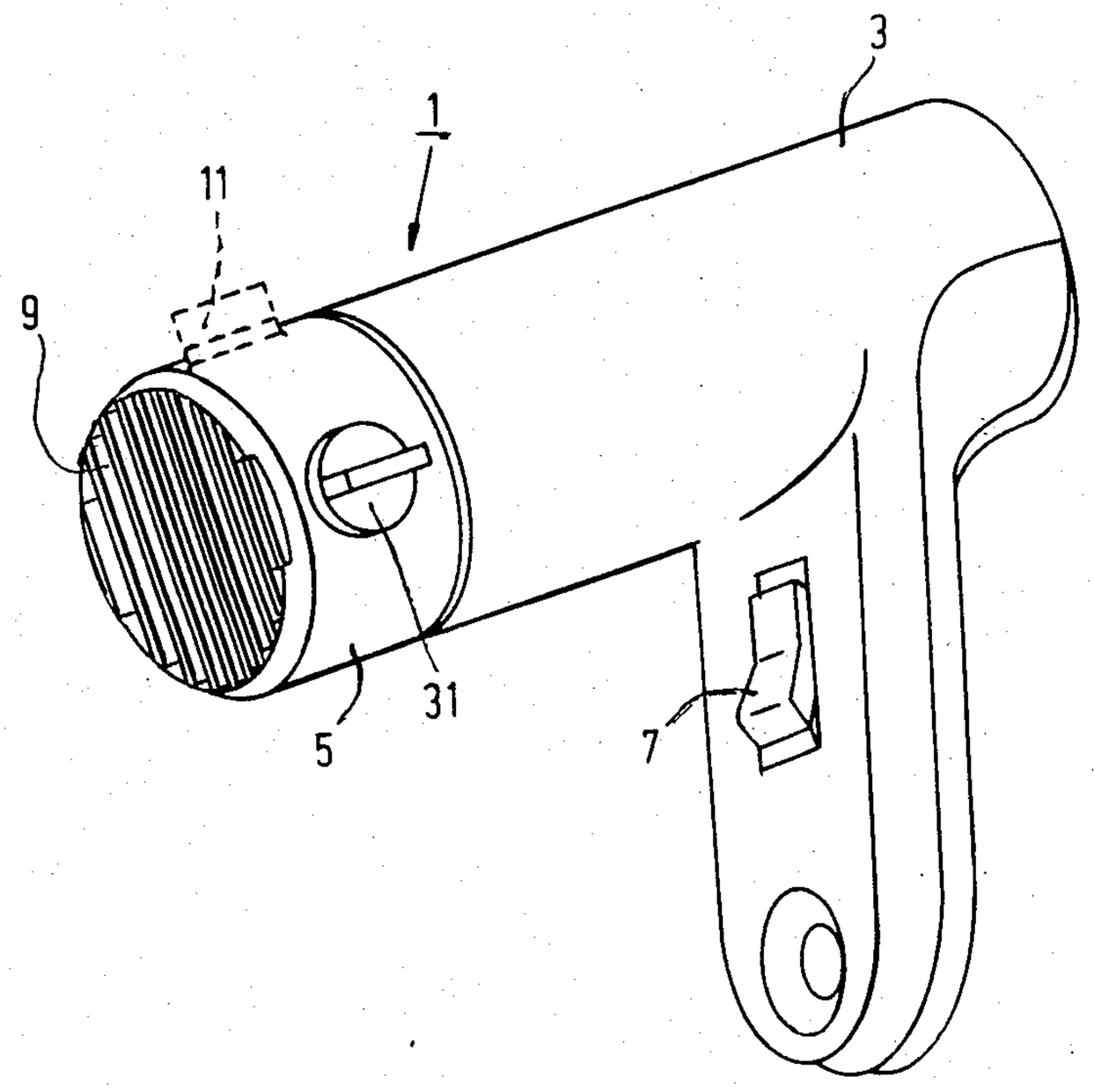


FIG.1

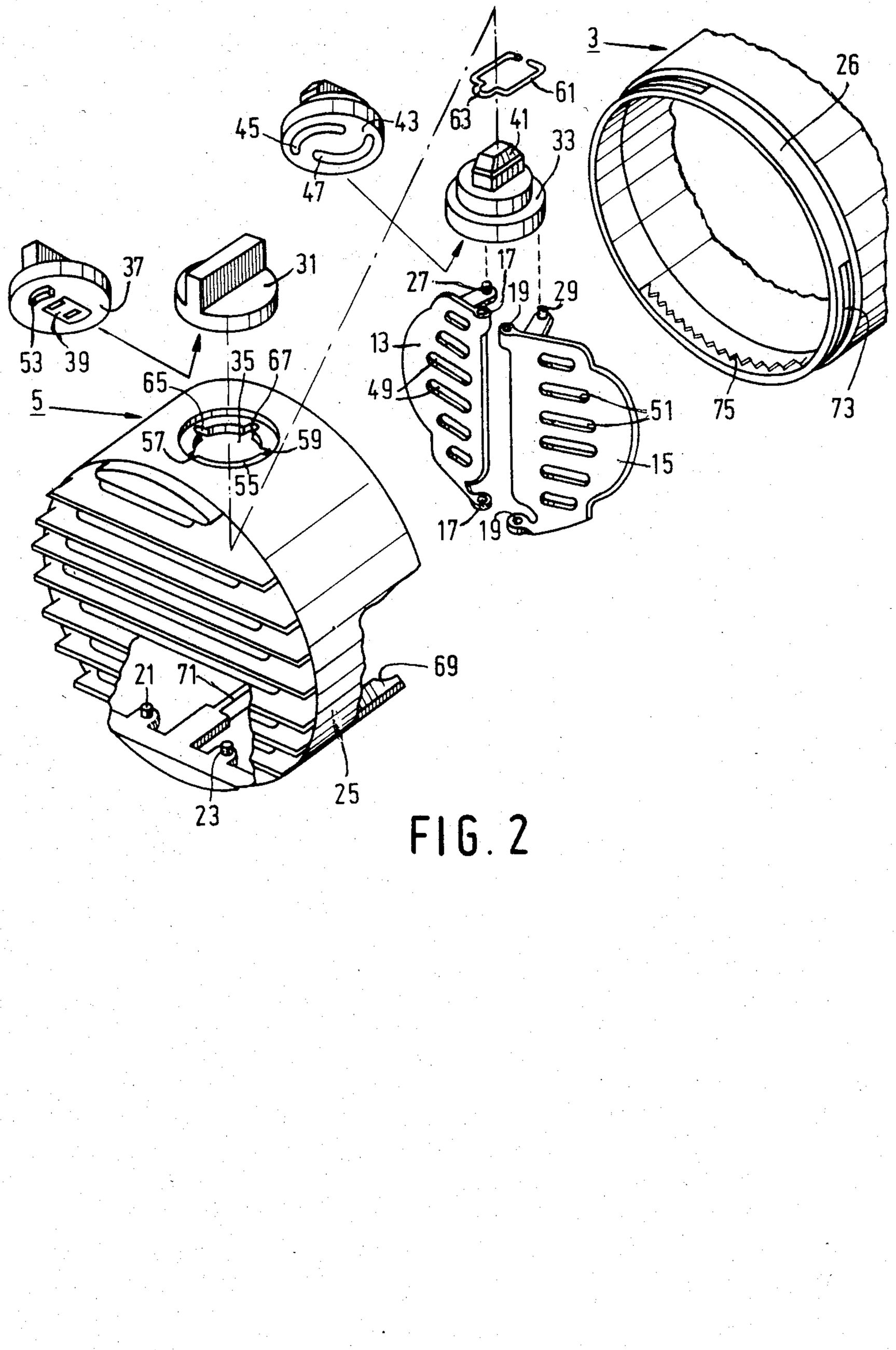

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FIG. 2

HAIR-DRIER WITH VALVES FOR CONTROLLING THE AIR FLOW

This invention relates to a hair-drier, which comprises a housing, which is provided with an air outlet, a heating element, a fan and two valves, which are pivotally mounted in the housing, for controlling the air flow, which valves can be actuated by means of a rotatable actuating member which extends through an opening in the wall of the housing.

Such a hair-drier is disclosed in U.S. Pat. No. 4,232,454. The known hair-drier has two diametrically arranged valves, which are situated in the space between the heating element and the air outlet. Both valves are formed with a slot, through which an actuating rod extends, the rod being provided with a right-hand screw-thread over a part of its length and with a left-hand screw-thread over another part of its length. Outside the housing of the hair-drier the rod is provided with a knob. By turning the knob the valves are pivoted towards or away from each other, to reduce or to increase the passage of air.

The known hair-drier has the disadvantage that mounting the valves and the actuating rod in the hair-drier housing is rather intricate. An additional disadvantage is that during operation the actuating rod is constantly exposed to the hot air, so that the knob becomes unnecessarily warm as a result of heat conduction.

It is the object of the present invention to improve the hair-drier of the type mentioned above so as to mitigate said drawbacks.

According to the invention the hair-drier of the invention is characterized in that the valves are each provided with a projection which co-operates with a curved slot formed in the actuating member.

Thus, the actuating member in the hair-drier in accordance with the invention has two slots, which each engage a projection. The slots are oriented so that during rotation of the actuating member the valves are pivoted towards or away from each other, depending on the direction of rotation, thereby reducing or increasing the air passage in the housing. When the speed of the fan remains the same a movement of the valves towards each other results in an increasing velocity of the outflowing air and a movement of the valves away from each other results in a decrease in this velocity. In this way a user can adjust the air-flow rate by turning the actuating member.

An advantage of the hair-drier in accordance with the invention is that a flow-rate control is obtained with an extremely simple and easy-to-assemble construction.

A preferred embodiment of the invention is characterized in that the actuating member comprises two parts which engage each other, of which a first part is disposed mainly outside the housing and of which a second part is disposed inside the housing, the slots being formed in said second part in the side which faces the valves.

The two-part actuating member has the advantage that it is secured to the housing wall by simply sliding the two parts into one another. A more permanent coupling between the two parts can be obtained through frictional forces or by means of a snap connection.

Another preferred embodiment is characterized in that one of the parts of the actuating member comprises a projection which co-operates with a circular groove in the housing wall, which groove adjoins the opening in the wall.

When the actuating member is turned the projection moves inside the groove, the two ends of the groove defining the maximum angle of rotation of the actuating member. An advantage of this embodiment is that the valves are not loaded unnecessarily in their extreme positions.

A further embodiment is characterized in that the actuating member contains a rectangular spring which is provided with a projecting portion which alternately co-operates with at least two recesses formed in the housing wall and adjoining the opening in the wall.

By means of this construction the valves can be latched in specific positions, so that the valve positions cannot change as a result of the air flowing past the valves.

A favourable embodiment is characterized in that the housing comprises two sections which are rotatable relative to each other, one of the housing sections including the air outlet, the valves and the actuating member and the housing sections each being provided with a connecting means and a latching means.

This embodiment allows the user to select the direction of the flow of air. Preferably, the connecting means comprises at least one projecting coupling portion on one of the housing sections and a circular groove which is formed in the other housing section and which co-operates with said coupling portion, and the latching means comprises a plate spring which is secured to one of the housing sections and teeth which are formed in the other housing section and which co-operate with said spring.

The invention will now be described in more detail with reference to the accompanying drawings, in which:

FIG. **1** is a perspective view of a hair-drier in accordance with the invention, and

FIG. **2** is a partly cut-away exploded view on an enlarged scale of a part of the hair-drier shown in FIG. **1**.

The hair-drier shown in FIG. **1** comprises a tubular housing **1** formed of a housing section **3** and a housing section **5** rotatable relative to each other. The housing section **3** is provided with an air inlet, a heating element and a fan, which parts are not shown. Moreover, the housing section **3** includes a switch **7** for actuation of the fan and the heating element. The housing section **5** has an air outlet **9** and an actuating member **11**, by means of which the air-flow rate can be adjusted.

Two valves or valve members **13** and **15**, shown in FIG. **2** can be actuated by means of the actuating member **11** and, in the assembled condition, said valves are arranged opposite each other and are pivotally mounted in the housing section **5**. The valves **13** and **15** are respectively formed with a pair of openings **17** and a pair of openings **19** which engage with two spindles **21** and **23** respectively, which spindles are secured to the wall **25** of the housing section **5**. In FIG. **2** only two of the four spindles are visible. Moreover, the valves **13** and **15** are provided with projections **27** and **29** respectively.

The actuating member **11** comprises two engaging parts **31** and **33**. The first part **31** extends into an opening **35** in the wall **25** and is mainly situated outside the housing section **5**. This first part **31** is formed as a knob in whose bottom surface **37** a recess **39** is formed. The second part **33** is situated inside the housing section **5** and is provided with a coupling element **41** which en-

gages the recess **39** in the first part **31**. The second part **33** has two curved, preferably circular, grooves or slots **45** and **47** in the side **43** facing the valves. The projection **27** engages in the groove **45** and the projection **29** in the groove **47**. When the knob **31** is turned the projections **27** and **29** move in the respective grooves **45** and **47**, the valves **13** and **15** being pivoted towards or away from each other, depending on the direction of rotation, about the spindles **21** and **23** respectively. When the valves **13** and **15** are pivoted towards each other the air passage is reduced and the flow rate increases if the speed of the fan remains the same. However, if the valves **13** and **15** are pivoted away from each other the air passage becomes larger so that the flow rate decreases. The valves **13** and **15** are formed with a plurality of apertures **49** and **51** respectively in order to ensure that the air passage cannot be closed completely by the valves.

The first part **31** of the actuating member **11** is provided with a projection **53** which engages a circular groove **55** in the wall **25**. When the actuating member **11** is rotated the projection **53** moves in the groove **55**, the ends **57** and **59** of the groove **55** defining the maximum angle of rotation of the actuating member **11**.

On the coupling element **41** of the second part **33** a rectangular spring **61** is arranged, having a projecting portion **63**. The spring **61** is accommodated in the opening **35** in the wall **25**, which is provided with two recesses **65** and **67**. If the projecting portion is located in one of the recesses **65** and **67**, the corresponding position of the valves **13** and **15** cannot be changed by the air flowing past them.

The housing section **5** is rotatable and lockable relative to the housing section **3**. For this purpose the housing sections is provided with a plurality of projecting coupling portions **69** and a plate spring **71** and the housing section **3** is provided with a partly circular groove **73** in the wall **26** and teeth **75**. The coupling portions **69** engage the circular groove **73** and the plate spring **71** alternately engages the gaps between the teeth **75**. By holding the housing section **3** and exerting a tangential force on the housing section **5** in a desired direction of rotation the housing section **5** is rotated relative to the housing section **3**. The portions **69** then slide in the groove **73** and the plate spring **71** is moved across the teeth **75**. In the desired position the plate spring **71** engages one of the gaps between the teeth **75**, so that the housing sections **3** and **5** are latched relative to each other.

What is claimed is:

1. A hair-drier which comprises a tubular housing having an air outlet; two valve members pivotally mounted in the housing for controlling the flow of air therethrough; an opening formed in the wall of the housing; a rotatable member extending through said opening for actuating said valve members; two curved slots formed in said actuating member; and a projection on each valve member for respective engagement with said curved slots whereby, upon turning of the actuating member, said valve members are pivoted in opposite directions.

2. A hair-drier according to claim **1**, in which the actuating member comprises a first part and a second part engageable with each other, the first part being disposed mainly outside the housing and the second part being disposed inside the housing, the curved slots being formed in said second part.

3. A hair-drier according to claim **2**, in which one of the actuating member parts has a projection engageable with a circular groove formed in the housing wall adjacent the opening in said wall.

4. A hair-drier according to claim **1**, in which the actuating member includes a rectangular spring formed with a projecting portion alternately engageable with at least two recesses formed in the housing wall adjacent the opening in said wall.

5. A hair-drier according to claim **1**, in which the housing comprises two sections rotatable relative to each other, one housing section including the air outlet, the valve members and the actuating member, and which includes means for connecting and means for latching the two housing sections to each other.

6. A hair-drier according to claim **5**, in which the connecting means comprises at least one projecting coupling portion on one housing section and a partly circular groove formed in the other housing section for engagement by said coupling portion, and the latching means comprises a plate spring secured to one housing section and teeth formed in the other housing section for engagement by said plate spring.

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